

LLNL Environmental Restoration Division (ERD)  
Standard Operating Procedure (SOP)

**ERD SOP 1.17: Treatment Facility Vapor Sampling  
and Analysis—Revision: 2**



**AUTHOR(S):**  
B. Johnson

**APPROVALS:** **Date**

Albert J. Lamane 9/9/03  
Division Leader

Ed John 9/8/03  
Engineering Group Leader

**CONCURRENCE:** **Date**

Rebecca Goodrich 8/29/03  
QA Implementation  
Coordinator (Acting)

### 1.0 PURPOSE

This standard operating procedure (SOP) describes the sampling procedures that will ensure the collection of representative samples and accurate analytical measurements of volatile organic compound (VOC) concentrations in vapor before and after treatment.

### 2.0 APPLICABILITY

This procedure is applicable to the sampling of vapor at Environmental Restoration Division (ERD) treatment facilities.

### 3.0 REFERENCES

- 3.1 Thermo Environmental Instruments Inc. MODEL 680 Hydrocarbon Vapor Meter (Instruction Manual)
- 3.2 ERD Standard Operating Procedure 4.8, "Calibration/Verification and Maintenance of Measuring and Test Equipment (M&TE)."

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## 4.0 DEFINITIONS

See SOP Glossary.

## 5.0 RESPONSIBILITIES

### 5.1 Subproject Leader (SL)

The Treatment Facility SL is responsible for determining sampling plan requirements.

### 5.2 Treatment Facility Technician (TFT)

The TFT is responsible for properly collecting samples and field measurements per the ERD SOPs and facility sampling plan.

## 6.0 PROCEDURE

Concentrations of VOCs in vapor may be determined in the field as described in Section 6.1 or the vapors can be collected and sent to an analytical laboratory for analysis as described in Section 6.2. There are two prescribed analyses available to detect VOCs in vapor. TO15DI is available through an outside Contracted Analytical Laboratory (CAL) and should be used for self-monitoring sampling and reporting purposes. Samples that are not being collected and analyzed for self-monitoring and reporting purposes may be analyzed at an onsite lab using a modified TO14 analysis. Samples should be collected and analyzed as determined by the facility sampling plan and/or SL.

### 6.1 Field Measurements

#### 6.1.1 Documentation

Field measurements of VOC concentrations in vapor shall be recorded in the Controlled Facility Log Book. SOP 4.2, "Sample Control and Documentation" describes the information that is required to be documented in the Log Book.

#### 6.1.2 Measuring and Testing Equipment (M&TE)

- An Organic Vapor Analyzer/Flame Ionization Detector (OVA/FID), a Thermo Hydrocarbon Analyzer or an equivalent instrument may be used.
- Select a critical piece of M&TE listed on the ERD M&TE list (see SOP 4.8, "Calibration/Verification and Maintenance of Measuring and Test Equipment [M&TE]").
- Before using the M&TE, ensure that it complies with the critical M&TE requirements described in SOP 4.8.
- Calibrate the M&TE per SOP 4.8.
- Consult the instrument manual for operating instructions.

#### 6.1.3 Sampling and Analysis Under a Vacuum

When sampling from a location that is under vacuum, a vacuum pump is attached directly to the sample port. At this point, the M&TE can be attached to the effluent point of the vacuum pump. An M&TE sample/reading is taken until the reading displayed is stabilized. Consult the M&TE manual for measurement instructions.

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Note: It is recommended that a typical T-fitting be used between the vacuum pump and the M&TE sample point intake to maintain proper flow through M&TE meter.

Note: When possible, sample ports from the lowest expected concentration to the highest expected concentration.

#### 6.1.4 Sampling and Analysis Under Ambient Conditions

When sampling at an area not under vacuum, it is not necessary to use the vacuum pump to deliver the sample to the M&TE meter. Simply attach the T-fitting influent port to the sample port, and the discharge port of the sample T-device to the M&TE.

Note: When using this method to sample, check the vent portion of the sample T-device for a positive pressure. At this point if the pressure is not positive, it will be necessary to connect the M&TE directly to the sample port.

Note: When possible, sample ports from the lowest expected concentration to the highest expected concentration.

## 6.2 Analytical Laboratory Measurements

Vapor samples are collected following the steps below and sent to an analytical laboratory for measurement.

6.2.1 When sampling from a location that is under vacuum, a vacuum pump is attached directly to the sample port of choice. After allowing time for all lines to purge (see 6.2.2), attach the Tedlar® bag (or equivalent) to the effluent side of the vacuum pump and fill the Tedlar bag with the sample vapor.

6.2.2 To calculate the length of time for purging three tubing volumes, first measure the length of tubing, determine the volume in liters per minute that are being drawn, and then consult Attachment A for the appropriate time.

Note: When possible, sample ports from the lowest expected concentration to the highest expected concentration.

6.2.3 Tedlar® bags should be sent to the CAL and analyzed as soon as possible due to a 24-hour hold time. The samples should be transported in a cooler without ice and exposure to sunlight should be avoided. Follow ERD SOP 4.2 for proper sample control and documentation and SOP 4.4, "Guide to the Handling, Packaging, and Shipping of Samples" for shipping and handling procedures.

## 7.0 QA RECORDS

- 7.1 Facility Logbooks
- 7.2 M&TE Calibration and Maintenance Log Books
- 7.3 Analytical Results
- 7.4 CoCs (Chain of Custodies)
- 7.5 Self-Monitoring Report

## 8.0 ATTACHMENTS

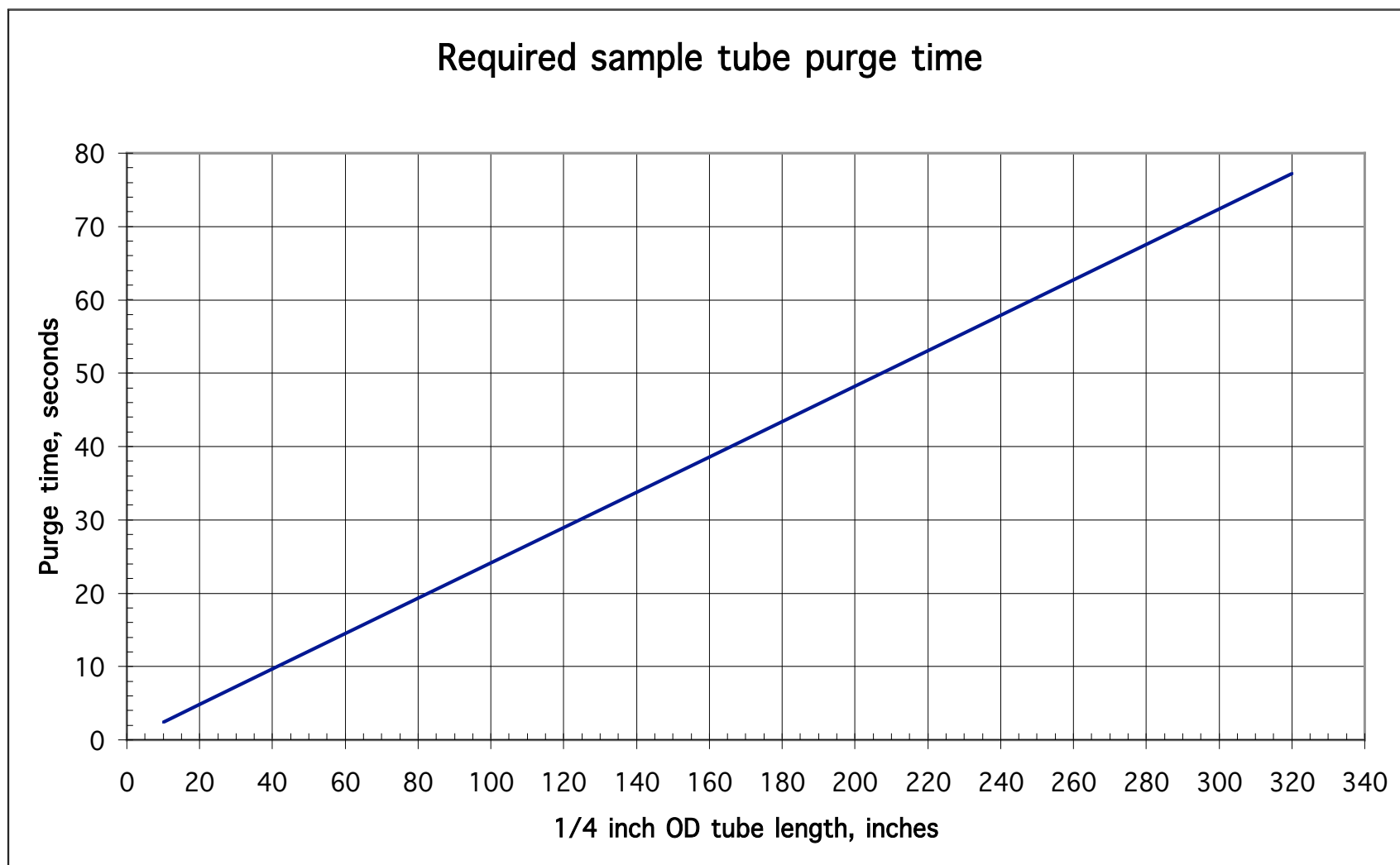
Attachment A—Purge Time Calculation for Tubing

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## **Attachment A**

### **Purge Time Calculation for Tubing**





**Attachment A. Purge time calculation for tubing.**